

Synaphea xela (Proteaceae: Conosperminae), a new species from the Jurien-Eneabba area of south-west Western Australia

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Abstract

Synaphea xela R. Butcher is described here as new and differentiated from similar species and regional congeners. *Synaphea xela* is restricted to the Jurien-Eneabba area of Western Australia and is currently known from only three populations over an area of approximately 55 km². A Conservation Code of Priority Two is considered appropriate for this species based on the paucity of collections and the high level of species endemism in this region.

Keywords: *Synaphea*, Proteaceae, Southwest Australian Floristic Region, kwongan, taxonomy.

Introduction

The Southwest Australian Floristic Region (SWAFR) is recognised for its extraordinarily high levels of species diversity and endemism (Myers *et al.* 2000, Hopper & Gioia 2004), especially among the large Gondwanan families Proteaceae, Restionaceae and Myrtaceae (Paczkowska & Chapman 2000, Hopper & Gioia 2004). Within Proteaceae, 16 genera comprising 869 formally recognised species and subspecies (99% endemic) are recorded as occurring within the 302 627 km² comprising the SWAFR (Cowling & Lamont 1998), with many large (e.g. *Grevillea*, *Hakea*, *Banksia*/*Dryandra sensu* Mast 1998, Mast *et al.* 2005) and moderately large (e.g. *Conospermum*, *Petrophile*, *Synaphea*, *Isopogon*) genera having undergone massive *in situ* diversification leading to the production of species flocks (Cowling & Lamont 1998).

Two major centres of species richness have been identified for Proteaceae within the SWAFR; the first occurring on the northern sandplain and centred on the Mt Lesueur area, and the second on the south coast stretching from the Stirling Range to the Fitzgerald River area (Speck 1958, Gibson *et al.* 1997). A number of Proteaceae genera clearly exhibit a bimodal heathland pattern of diversity (e.g. *Conospermum*, *Dryandra*, *Grevillea*, *Hakea*, *Isopogon* and *Petrophile*), while others (e.g. *Adenanthos*, *Banksia s.s.* and *Lambertia*) have their species richness concentrated in the southern heathlands (Speck 1958, Gibson *et al.* 1997). These kwongan communities are also characterised by their high levels of locally endemic species, with only 16% of 303 species of Proteaceae occurring in the two heathland centres found to be common to both (Speck 1958). The high levels of beta diversity displayed by SWAFR Proteaceae are emphasised in genera such as *Banksia s.s.*, where 48% of species are locally endemic habitat specialists (Cowling

& Lamont 1998). The patterns of distribution and endemism of species are closely tied to local geology, soil type and soil structure such that a diverse array of species can occur in close proximity where there are small differences in the underlying substrate (Butcher 2004). This is especially pronounced in the northern sandplain where, in the lateritic uplands around Mt Lesueur, the overall species composition of plots c. 1 km apart can vary by up to 60% (Hopkins & Griffin 1984).

The SWAFR endemic genus *Synaphea* R.Br. is undergoing taxonomic revision and currently comprises 51 named species (George 1995, Butcher 2000) and 12 undescribed taxa (Western Australian Herbarium 1998 onwards) in addition to numerous unclassified collections, many of which may be resolved as discrete taxa with further study. The taxa within *Synaphea* display high levels of regional endemism and this is reflected in the large number of conservation listed species (Western Australian Herbarium 1998 onwards, Atkins 2005). Examples of locally endemic and geographically restricted taxa from the northern sandplain include *S. recurva* A.S.George, *S. spinulosa* (Burm.f.)Merr. subsp. *borealis* A.S.George, *S. aephyrsa* A.S.George (Priority 3), *S. lesueurensis* A.S.George (Priority 2), *S. endothrix* A.S.George (Priority 2), *S. oulopha* A.S.George (Priority 1) and *S. xela* R.Butcher, the new species described in this paper.

The close morphological similarity between the species of *Synaphea*, combined with their high level of regional specificity, has meant that many new species have been collected for the first time only recently. Putatively new taxa are frequently overlooked in the field through being mistaken for more common species or, if collected, are regarded as aberrant specimens of named species. *Synaphea xela* is one such species, first collected in 1993 by A.S. George during his preparation of the *Flora of Australia* treatment of the genus (1995) but subsequently unplaced due to a lack of corroborating collections. Further close examination of these specimens and additional fieldwork suggests this material

represents a distinct taxon. *Synaphea xela* is described here, prior to the completion of a full taxonomic revision of the genus, due to its apparent rarity.

Methods

This study is based on examination of herbarium collections (including types) from PERTH, supplemented by type material of an additional ten names from the collections of BM, K and MEL. Measurements of habit, stems and leaves were made from live material and herbarium specimens, with floral features measured from 70% ethanol preserved material and reconstituted flowers.

Taxonomy

Synaphea xela R. Butcher sp. nov.

Fruticulus expansus 0.1–0.4 m altus, c. 0.6 m latus. Petiolus 90–190 mm longus, glaber vel glabrescens. Folia e viridia caeruleis, glauca, 3-vel 4-plo trilobata, pinnatipartita, apicibus prominente mucronatis; lamina applanata vel undulata, secus nervum medium plicata. Inflorescentia 50–105 mm longa, circum folia aequantia vel eis longiora; pedunculi 50–210 mm longi, 1-3-plo ramosi, sparse appresse pubescenti; bracteae ovatae, 1–2.1 mm longae, glabrae. Perianthium glabrum; tepalum adaxiale curvatum, 4.9–5.7 mm longum, 2.2–2.7 mm latum, marginibus valde retrocurvatum; tepalum abaxiale 2.8–3.3 mm longum, 1.2–1.4 mm latum. Stigma ovatum vel quadratum, 0.8–0.95 mm longum, 0.9–1.3 mm latum; ovarium 1/2–3/4 inferiorius subtiliter sericeum vel pubescentium, trichomatibus apicalibus amplificatis ad basim angulatis. Fructus angustissime obovatus, 5–6.9 mm longus, 2.2–2.8 mm latus, sessilis, in rostrum breve apicale late conicum contractus.

T: c. 15 km NE of Eneabba [precise locality withheld for conservation purposes], W.A., 28 Aug. 1999, R. Butcher RB 690; holo: PERTH 07344058; iso: AD, CANB, K, MEL, NSW, NY.

Sprawling subshrub 0.1–0.4 m tall, c. 0.6 m wide. Numerous stems from base, 25–50 mm long, smooth, tight, grey-brown bark with longitudinal fissures, glabrous or with scattered appressed hairs, patches of dense, appressed hairs under and near leaf bases; internode stems 15–105 mm long, yellow-pink, glabrous to lightly appressed pubescent, lightly glaucous. *Petiole* 90–190 mm long, glabrous to glabrescent, few hairs at junction with sheath, lightly glaucous in grooves; sheath pinkish-light brown at margins, glabrous to glabrescent externally, tomentose to appressed densely silky internally. *Leaves* dull, dark blue-green, 3–4 x trilobed, pinnatipartite; ultimate lobes linear, oblong or broadly triangular, 2–11 mm long, 2–5.5 mm wide; apices acute, obtuse or rounded with prominent mucro, 0.8–1.7 mm long; lamina 40–85 mm long, 50–115 mm wide, glabrous, glaucous, concolorous; reticulation fine to moderate, shallow; stomatal guard cells prominent, +/- flush with epidermis; lamina flat to undulate, folded along midline, multiplanar, ultimate lobes gently concave; juvenile leaves bright red and pubescent; red with moderate to dense white pubescence, pinnatipartite. *Inflorescence* of

terminal spikes, 50–105 mm long, c. equal to or shortly exceeding leaves, flowers moderately spaced, internodes 1.5–5 x flower length at base, 1/5–1 x flower length below lowest bud; peduncles green or green and red, 50–210 mm long, 1–3 x branched, sparsely appressed pubescent; basal sheath pink-red, 6–7.5 mm long, glabrous or with scattered hairs along midline and at apex externally, appressed silky along midline internally, margins ciliate; rachis green or green and red, glabrescent to sparsely pubescent at base, lightly pubescent at apex; bracts ovate, +/- horizontal to gently ascending, acute to obtuse, 1–2.1 mm long, glabrous with ciliate margin. *Perianth* curved horizontally to gently ascending, opening moderately to widely, glabrous; adaxial tepal strongly curved behind filament, 4.9–5.7 mm long, 2.2–2.7 mm wide, apex erect to hooded, margins strongly flared backwards, glabrous internally; abaxial tepal strongly convex, 2.8–3.3 mm long, 1.2–1.4 mm wide, the apex reflexed to 0.1–0.2 mm of length, hairs present behind anthers; lateral tepals gently falcate, 3.2–3.6 mm long, 2–2.7 mm wide, the apex reflexed to 0.2–0.6 mm of length, hairs present behind anthers. *Stigma* ovate to quadrate with slightly inrolled margins, broadly and shallowly emarginate to 0.1–0.2 mm of length, 0.8–0.95 mm long, 0.9–1.3 mm wide, +/- flat and reclining to concave in upper half ventrally. Ovary ovoid to obovoid with broadly conical beak to 0.2 mm long (after style separates), 1–1.2 mm long, 0.7–0.8 mm wide, finely silky to pubescent in lower 1/2 to 3/4, glabrous to sparsely pubescent at apex, beak glabrous to very sparsely puberulous, ring of 20–23 enlarged, translucent gland-like hairs at apex, hairs kinked at base then incurved over apex. *Fruit* very narrowly obovoid, smooth to very finely ribbed, 5–6.9 mm long, 2.2–2.8 mm wide, sessile, lightly pubescent in lower 1/2 to 3/4, glabrous to sparsely pubescent at apex, tapering evenly into a short, broadly conical, glabrous to sparsely puberulous beak (c. 0.2 mm long). *Seed* not seen. (Fig. 1 A–H)

Flowering, July–September. *Fruiting*. Fruits have been collected in August.

Specimens examined (6 of 6): WESTERN AUSTRALIA: c. 20 km NE of Jurien [precise locality withheld], 27 Aug. 1997 R. Butcher & J.A. Wege RB 99 (UWA); 28 Aug. 1997 R. Butcher & J.A. Wege RB 102 (PERTH); 28 Aug. 1999 R. Butcher RB 689 (AD, CANB, K, MEL, PERTH); c. 15 km NE of Eneabba [precise locality withheld], 12 Aug. 1993 A.S. George 17039 (BRI, DNA, HO, PERTH); c. 25 km ESE of Jurien [precise locality withheld], 13 Aug. 1993 A.S. George 17049 (BM, NSW, PERTH).

Distribution. *Synaphea xela* has only been collected from north-east of Eneabba, on the edge of Wotto Nature Reserve, and from two small areas north-east and east-south-east of Jurien, on the edge of Mt Lesueur National Park (Fig. 2).

Habitat. The two areas where *Synaphea xela* occurs both have undulating topography but slightly different habitat. Near Eneabba the species grows in red-brown gravelly sand and loam over laterite, in kwongan heath comprising species of *Grevillea*, *Melaleuca*, *Hakea*, *Dampiera*, *Daviesia* and *Boronia*. Near Jurien the species grows in white-pink, grey-brown or brown clayey sand over laterite, in very open *Eucalyptus* woodland or heath abutting woodland, with species of *Hakea*, *Hibbertia*, *Comesperma*, *Daviesia*, *Gastrolobium*, *Mesomelaena*,

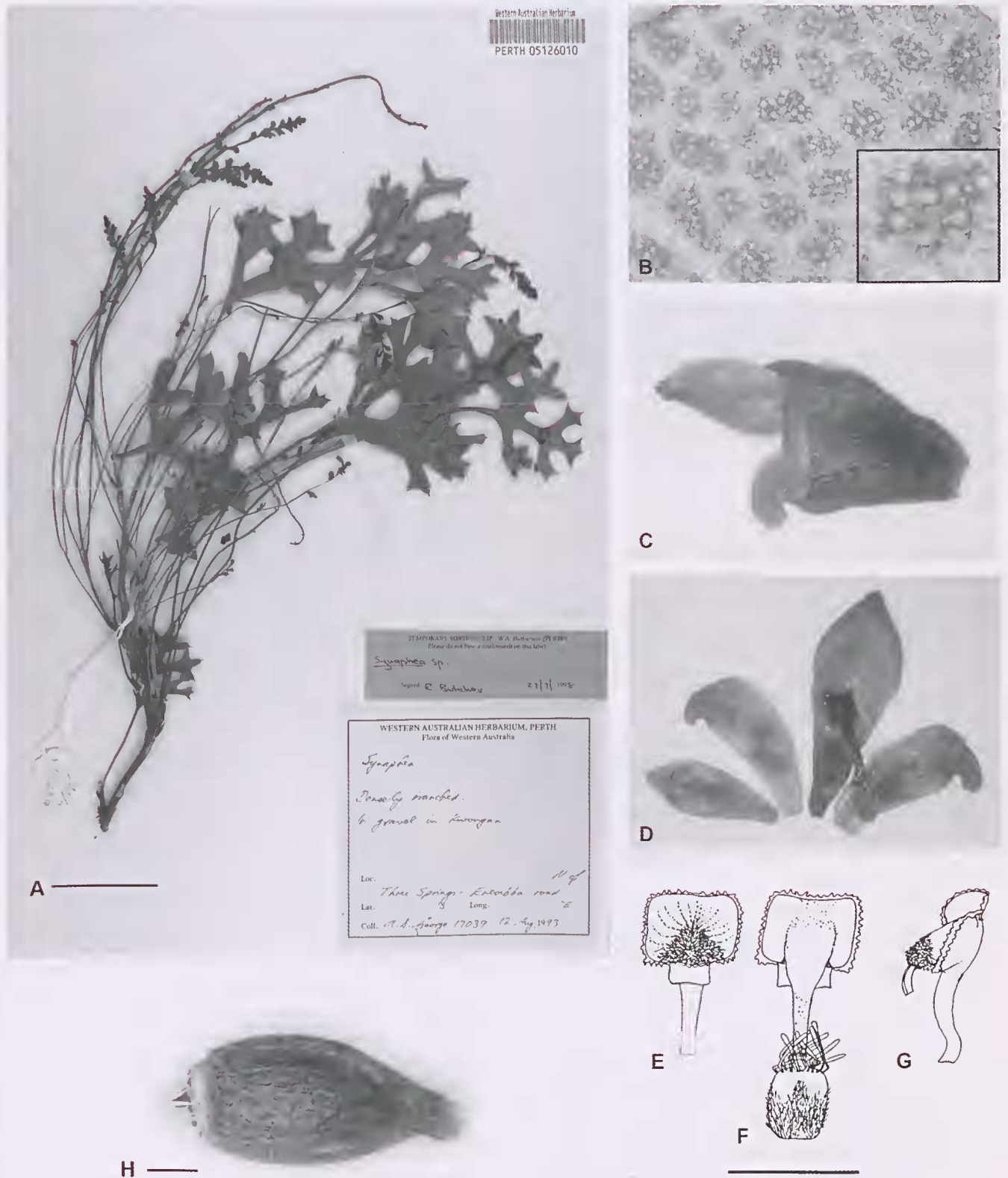


Figure 1. Images of *Synaphea xela*. A - Herbarium specimen; B - Leaf surface showing shallow reticulation and glaucous coat (inset - magnification showing stomatal guard cells +/- flush with the epidermis); C - Reconstituted flower showing floral shape and curvature of the lateral and adaxial tepal limbs and apices; D - Dissected reconstituted flower showing tepal shapes and gynoecium *in situ*; E - Ventral view of stigma showing the thickened, papillose lower half, gently concave upper half and fringing mucilage; F - Dorsal view of stigma showing the connection to the style and the ovary glabrous in the upper third with a ring of enlarged, kinked, apical trichomes; G - Lateral view of stigma showing the angled ventral surface and incurved margins; H - Fruit. A - D taken from A.S. George 17039, E - H taken from R. Butcher RB 690. Scale bar = 10 cm (A), 1 cm (B) and 1 mm (C - H).

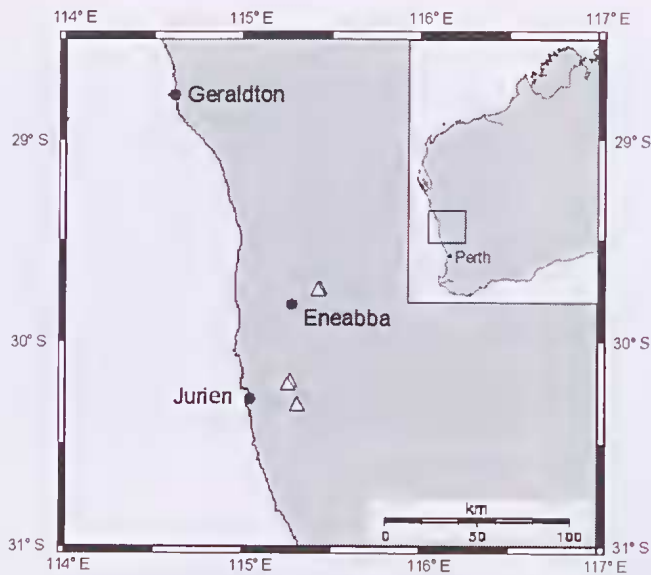


Figure 2. Distribution of *Synaphea xela* on the northern sandplain of south-west Western Australia.

Lambertia, *Dampiera*, *Xanthorrhoea*, *Conospermum* and *Thomasia*.

Etymology. This name of this species honours Alexander S. George for his significant contribution to the taxonomy of *Synaphea* and for his enthusiasm and support. In keeping with the nomenclatural tradition he started in *Synaphea* with *S. aephynsa* and *S. panhesya*, the epithet *xela* is an anagram of Alex.

Conservation status. A Priority 2 conservation code is considered appropriate for this species (CALM Conservation Codes for the Western Australian Flora, Atkins 2006). *Synaphea xela* is a very poorly known taxon which appears to be restricted geographically.

Affinities. *Synaphea xela* is distinctive among the species of *Synaphea* occurring on the northern sandplain in its combination of decumbent to sprawling habit, blue-green foliage, broad, shortly lobed leaves with long apical mucro, and its more-or-less quadrate, gently concave stigma with a broadly and shallowly emarginate apex.

Among the regional congeners, *Synaphea oulopha* is extremely distinctive in its clumped habit, highly divided, narrowly lobed leaves with very prominent reticulation, very small, openly spaced, dull yellow flowers, narrowly oblong stigma and the absence of apical trichomes on the ovary. Similarly, *S. endothrix* and *S. spinulosa* can be easily distinguished from *S. xela* by their erect habit, distinctly pubescent stems and peduncles, more densely arranged, puberulous to pubescent flowers and a more-or-less obovate stigma possessing broad, lateral lobes. *Synaphea aephynsa* is more similar to *S. xela* in its glabrous flowers and stigma morphology but is distinguished by its clumped to erect habit, yellow-green leaves with scarcely mucronate apices and less curved flowers with less reflexed margins and apices.

Some specimens of *Synaphea lesueurensis* and *S. xela* have similar leaf form; with narrowly obovate to oblanceolate ultimate leaf lobes, but *S. lesueurensis* has shorter petioles and lacks the prominent mucro seen in *S. xela*. *Synaphea lesueurensis* is also distinguished by its habit, in which the inflorescences are typically tangled through the leaves. Both of these species have widely opening flowers which are horizontally oriented, or gently ascending, in which the adaxial tepal is strongly curved behind the sterile filament, but *S. lesueurensis* has a prominently erect adaxial tepal apex and a stigma which is distinctly ovate with a small apical notch. *Synaphea quartzitica* is similar to *S. xela* in habit, leaf colour, prominently mucronate leaf apices, glabrous flowers and strongly reflexed adaxial tepal margins, but can be distinguished by its deeper, more angular leaf division, smaller flowers and narrowly oblong stigma.

Beyond the northern sandplain, *Synaphea xela* is similar in its habit to *S. damopsis*, *S. decumbens* and *Synaphea* sp. York (*F. Hort 666*), which are decumbent to sprawling taxa found in wandoo and/or jarrah woodlands of the Darling Plateau. *Synaphea damopsis* and *S. decumbens* can be distinguished from *S. xela* by their flat to undulate leaf lamina which is usually tapered into the petiole over a long distance, their pubescent perianth and bracts, as well as the sparse to dense wavy hairs on the rachis, peduncle, petiole and leaf lamina. These species are also distinctive in having an ovate stigma which is distinctly narrowed at the apex and strongly concave on the ventral surface. The stigma morphology of *Synaphea* sp. York (*F. Hort 666*) is similar to that of *S. xela*, but this taxon has larger abaxial tepals (4.4–5.1 mm long, 1.5–1.8 mm wide) and a larger stigma (1.2–1.3 mm long, 1.4–1.7 mm wide), and smaller (4.5–5.2 mm long), obovoid fruits.

Notes. This taxon was previously known as *Synaphea* sp. Eneabba (A.S. George 17039) on FloraBase (Western Australian Herbarium 1998 onwards).

The flowers of *Synaphea xela* tend to open tardily and many collections appear to have cleistogamous flowers, with fruits still developing on the plant.

Three unplaced *Synaphea* collections at PERTH (A.S. George 16999, R. Butcher RB 438 and R. Butcher RB 439) from a single location alongside Carani West Road, east of New Norcia, are similar to *S. xela* in habit and leaf morphology but differ in their pubescent flowers and bracts, as well as a denser pubescence on the rachis and peduncle, a transversely oblong stigma with broad lateral lobes and the ovary pubescent throughout. These specimens may represent a distinct taxon allied to *S. xela*, but additional collections are required to confirm this.

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